SOME NEMATODES FROM AUSTRALIAN BIRDS AND MAMMALS

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SUMMARY

1. *Austrofilaria rhipidurae* n. sp., is described from *Rhipidura leucophrys*, Adelaide, differing in the form of the vestibule and length of spicules from the only other known species in the genus, *A. vestibulata*.
2. *Diomedenema diomedeae* n. g., n. sp., Filariidae, from the body cavity of *Diomedea chrysostoma*, South Australia. The new genus appears to be related to *Litomosa*, *Litomosoides* and *Austrofilaria*, differing from the first two in the presence of cephalic papillae and buccal teeth, and from the third in having an undivided oesophagus, and in the position of the vagina.
3. An amplified description of *Tetrameres australis* from the black swan, and an account of some of its growth stages are given.
4. *Cosmocephalus australiensis n. sp.*, is described from water rats, *Hydromys chrysogaster*.
5. Occurrences of various Ascaridate, Spirurate, Filariate and Strongylate worms are recorded from Australian hosts.

HOST-PARASITE LIST

MAMMALS

Gypsophoca tasmaniensis Scott and Lord:—*Contracaecum osculatum* (Rud.); *Stomachus* sp. immature. Lady Julia Percy Island, Victoria.

Vulpes vulpes L.:—*Uncinaria stenocephala* Raill. Adelaide.

Hydromys chrysogaster Geoff.:—*Cosmocephalus australiensis* n. sp.; *Spirura* (s.l.) sp. South Australia.

Macropus major Shaw:—*Hypodontus macropodis* Mönnig, N.S.W.; *Pharyngostrongylus alpha*, Narandera, N.S.W.

Macropus rufus Desm. (albino):—*Pharyngostrongylus alpha* J. and M. Adelaide Koala Park, but originally from Mount Pleasant, S. Aust.

Isoodon torosus Ramsay:—*Echinonema cinctum* Linstow; *Subulura peramelis* Baylis. South-east Queensl.

BIRDS

Diomedea (*Thalassarche*) *chrysostoma* Forster:—*Seuratia shipleyi* (Stoss.); *Stegophorus diomedeae* (J. and M.); *Diomedenema diomedeae* n. g., n. sp. Brighton, S. Aust.

Falso peregrinus Tunstall:—*Serratospiculum guttatum* (Schn.). Kangaroo Island, S. Aust.

Chenopis atrata Lath.:—*Tetrameres australis* J. and M. Tailem Bend, S. Aust.

Rhipidura leucophrys Lath.:— *Austrofilaria rhipidurae* n. sp. Adelaide, S. Aust.

We acknowledge assistance in regard to material from Dr. H. Derrick, Queensland Institute of Medical Research, Brisbane; Messrs. A. Rau, South Australian Museum; G. G. and Bryce Jaensch, Tailem Bend, South Australia; H. M. Gordon, McMaster Laboratory, Sydney; and J. McNally, Fisheries and Game Department, Victoria. The material from an albatross was obtained by one of us from a bird washed ashore at Brighton, South Australia, after a storm. The work has been assisted by a State Research Grant to the University of Adelaide. Types of new species are being deposited in the South Australian Museum.

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Austrofilaria rhipidurae n. sp.

(Fig. 1-3)

Several filarial worms were taken by Mr. A. Rau from behind the eye of a willy-wagtail, *Rhipidura leucophrys,* Adelaide. Males up to 14·7 mm. long; females to 28 mm. Anterior end rounded, with four large oral papillae. Oral aperture sometimes on small projection (fig. 2). Vestibule present, with strongly chitinized walls and narrow lumen.

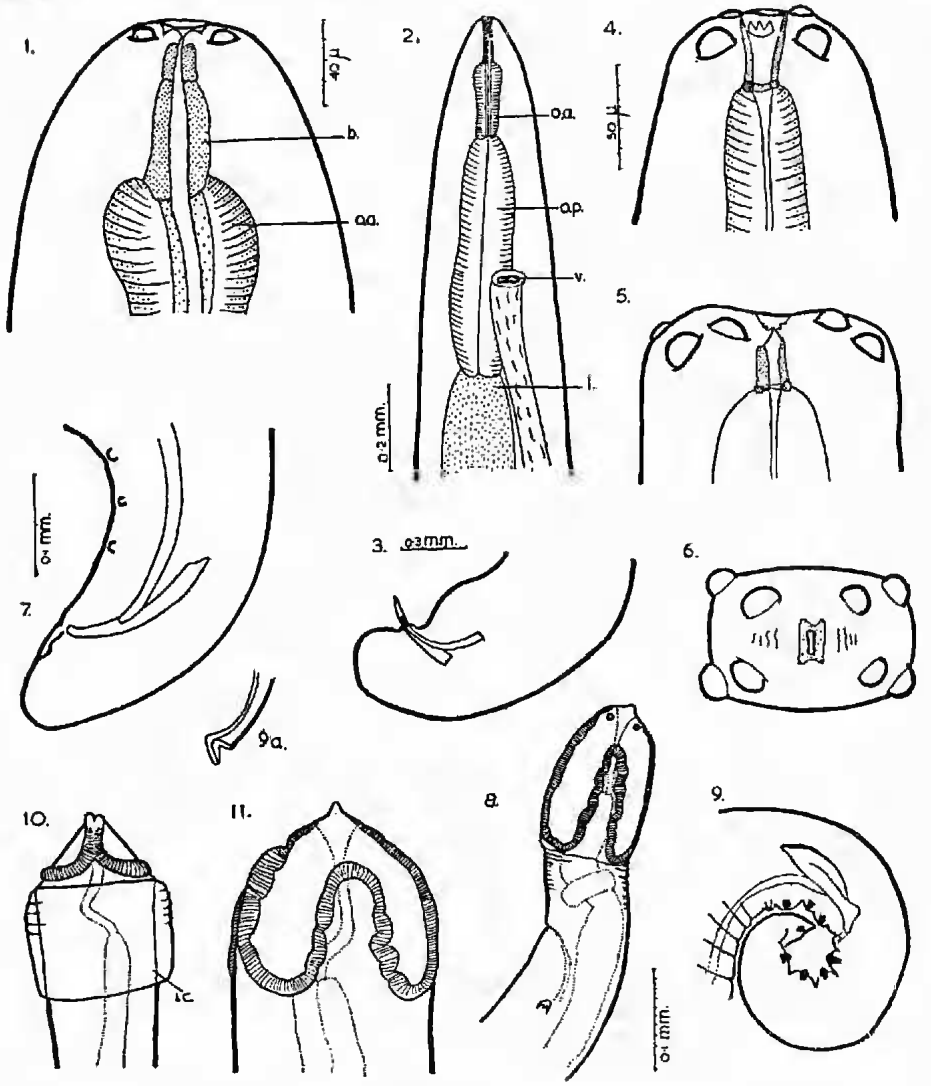

Fig. 1 3

Austrofilaria rhipidurae—1, head of female; 2 oesophageal region; 3, male tail.

Fig. 4-7

Diomedenema diomedeae—4, 5, 6, head in lateral, dorsal and in face views respectively; 7, male tail.

Fig. 8-11

Cosmocephalus australiensis—8, head of adult; 9, male tail; 9a, tip of longer spicule; 10, 11, heads of worms 3·4 and 6·3 mm. long respectively. Fig. 4, 5, 6 to same scale; 1, 10, 11 to same scale; 8, 9 to same scale. b, buccal capsule; i, intestine; ic, inflated cuticle; oa, op, anterior and posterior regions of oesophagus; v, vulva.

Walls consisting of anterior region 19μ long, and posterior part 53μ long. Oesophagus ·7 mm. long, narrower anterior part ·16 mm. long with strongly cuticularized lining which appears to be continuous with the vestibule; posterior part ·55 mm. long. Vulva in oesophageal region, ·6 mm. from head end. Eggs 50μ by 26μ, with embryos 65μ long; anus close to rounded tip of tail. Male tail coiled into short spiral; spicules equal, ·5 mm. long; no gubernaculum, caudal papillae absent.

The genus, originally erected for *A. vestibulata* from *Aphelocephala nigricincta*, appears to be near *Litomasoides* Chandler, resembling it in the presence of a subdivided vestibule whose posterior part seems to be encircled by the anterior portion of the oesophagus; but it is distinguished by the form of the spicules, the presence of oral papillae, and the position of the vulva. We have placed our species in *Austrofilaria* because of the presence of a marked chitinous vestibule, a bipartite oesophagus, small equal spicules, and the oesophageal position of the vulva. It differs from *A. vestibulata* in the form of the vestibule and in the length of the spicules.

Diomedenema diomedeae n. g., n. sp.

(Fig. 4-7)

A large number of these worms was found in the body cavity of a yellow-nosed albatross, *Diomedea chrysostoma*, washed ashore at Brighton, South Australia. Males up to 12 mm. long; females to 17 mm. Cuticle with minute punctations arranged in annuli and more obvious on some regions, *e.g.*, submedian line, but absent from end of tail. Anterior end compressed laterally; small rectangular mouth, dorso-ventrally elongate. Eight large papillae in two rings in submedian positions on head. Small amphids present. Vestibule 30μ long, 5μ wide from side to side, about 8-10μ dorso-ventrally; at its entrance, on each lateral wall, a strongly chitinized tricuspid tooth. Oesophageal lining strongly chitinized. Oesophagus ·6 mm. long in both sexes, part posterior to nerve ring wider. Excretory pore ·24 mm. from head end (in female); nerve ring at ·21 mm. in male.

Posterior end of male curved ventrally; anus ·1 mm. from tip of rounded tail; spicules acicular, unequal, ·21 and ·16 mm. long; one pair postanal papillae, one pair adanal, three pairs preanal.

Vulva anterior, 4·7 mm. from head end in worm 14·7 mm. long. Eggs 23μ by 58μ.

Generic diagnosis:—Relatively short filarial worms with anterior end compressed laterally; eight cephalic papillae in two rings. Mouth elongated dorso-ventrally, entrance to buccal cavity with two lateral tricuspid teeth; oesophagus not differentiated externally into two regions. Male tail short, rounded, without alae; spicules unequal. Vulva anterior, post-oesophageal. Parasites of birds. Type *Diomedenema diomedeae* n.sp.

This genus falls close to *Desmidocercella* Yorke and Maplestone. It differs in the shortness of the oesophagus, the presence of teeth in the buccal capsule, and in the absence of any spinose area on the tail.

It differs from *Austrofilaria* in the presence of buccal teeth and the position of the vulva. It shows some similarity to *Buckleyfilaria* Singh 1949, from passerine birds, in its cuticular ornamentation and in the presence of a buccal cavity; but it differs in the position of the vulva, the number of cephalic papillae and the dissimilarity of the spicules.

Serratospiculum guttatum (Sch.)

This filariid is now recorded from *Falco peregrinus*, collected by A. Rau on Kangaroo Island. We had reported it previously from Moorook, South Australia

ECHINONEMA CINCTRUN Linstow

Several specimens were found amongst material collected by Dr. H. Derrick from bandicoots, *Isoodon torosus*, from localities in south-eastern Queensland.

SEURATIA SHIPLEYI (Stoss.)

This species is now recorded from *Diomedea chrysostoma*, washed ashore at Brighton, South Australia. We have already recorded the parasite from other Australian albatrosses (1942, 69).

STEGOPHORUS DIOMEDEAE (J. and M.)

This species was described by us under *Paryseria* (1942, 69) from three species of Australian albatrosses including *Diomedea chrysostoma*, the latter from Sellicks Beach, South Australia. We now record finding the same species of nematode in another yellow-nosed albatross from Brighton, South Australia. We transferred the species to *Stegophorus* (1945, 142).

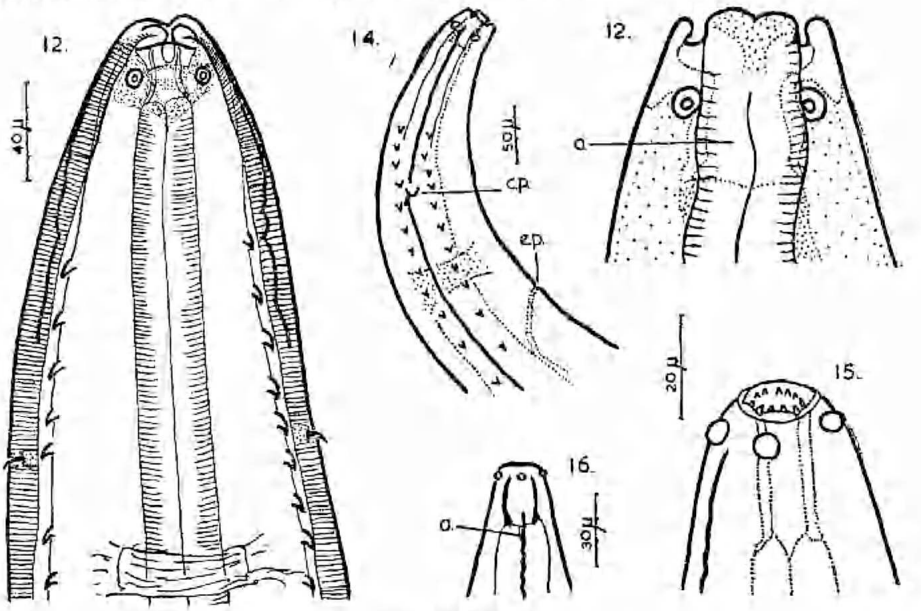

Fig. 12-16

Tetrameres australis—12, head of male, lateral view; 13, 14, anterior end of male, dorsal and lateral views respectively; 15, head of young female, sublateral view; 16, head of gravid female, lateral view. Fig. 12, 15 to same scale. a, lateral ala; cp, cervical papilla; ep, excretory pore.

TETRAMERES AUSTRALIS J. and M.

(Fig. 12-21)

This species was originally described by us (1941) from males. The present collection, also from the black swan, *Chenopis atrata*, from Tailem Bend, South Australia, includes adult males and females, as well as young females in various stages of development.

Male—Up to 8·1 mm. in length. The original account of the head is now amended. There are four lips, typical of the genus, the dorsal and ventral being purely cuticular, whereas the laterals are wider and contain "pulp". Four large submedian papillae. The cuticular thickening of the dorsal and ventral lips is continued as a reticulum around the head as far back as the level of the base of

the buccal capsule, and laterally forms the "spines" in the lateral alae (fig. 12). These alae are broad and voluminous. Each arises from a lateral lip and has the appearance of a ribbon attached along its centre, narrowing towards the cervical papilla, behind which it is attached along one edge. Sub-lateral rows of spines commence at ·1-·13 mm. from the head end. Cervical papillae, each in the form of a single curved spine, lie at the level of the third or fourth spine, about ·16 mm. from the head end. Buccal capsule 10μ in diameter from side to side, and 15μ dorso-ventrally, its base 28-30μ from top of lips. Nerve ring at ·24 mm., and excretory pore at ·3 mm. from head end. Oesophagus 1·6 mm. long in a worm 8·1 mm. in length.

Female—Young specimens up to 4·9 mm. long, length decreasing in older worms. The most swollen females were 3·5 mm. long. Lips not distinct. Lateral alae commence just behind cephalic papillae and extend to level of vulva, are less voluminous than in male, and are not associated with spines. Cervical papillae ·15-·17 mm. from head end. Buccal cavity in young specimens cylindrical, about 25-30μ long, 7μ internal diameter; anterior margin of buccal capsule denticulate, with 10-12 projecting teeth, surrounding mouth opening. In gravid females buccal capsule becomes barrel-shaped. Oesophagus with anterior and posterior regions, ·3 and 1·1 mm. long respectively. Nerve ring at ·22 mm. and cervical papillae at ·4 mm. from head end. As the body increases in volume, the swelling of the body wall in the four submedian fields extends to include the posterior part of the oesophageal region, and most of the tail, the tip of which in the largest female is almost lost to sight. The tip of the tail in younger females is surrounded by a distinct coronet of 6-7 spines. In gravid females the tail tends to be annulated and the spines, though present, are shorter and less distinct. Vulva at 5 mm. and anus at 2·3 mm. from tip of tail, in a specimen 4 mm. long, in which the body swelling is just beginning to occur.

The species is characterised by the very long male spicule. The presence of tail spines in this genus does not seem to be a purely larval condition as it is in some Acuariids. The species does not fall into either of the subgenera proposed by Travassos in 1915, as it possesses features described as distinctive of both subgenera, *viz.*, the excessively long spicule of *Microtetrameres*, and the body spines as in *Tetrameres* s. str.

Cosmocephalus australiensis, n. sp.

(Fig. 8-11)

Several collections of a species of *Cosmocephalus* have been taken from water rats, *Hydromys chrysogaster*, from the lower River Murray, at Tailem Bend and Bow Hill, South Australia.

Females up to 12·2 mm. long; males 10·1 mm. The cordons which bound raised cuticular areas reach a point ·04 mm. from the head end, but are not as markedly convoluted as in some species of the genus. Vestibule ·1 mm. long, 9μ wide. Cervical papillae ·3-·38 mm. from head end, tricuspid in both sexes, except in one specimen where the smaller cusp was double. The foregoing measurements apply to both sexes. Cituele strongly annulate from head to cervical papillae.

Amongst the material examined were some apparently fully mature worms in which the cuticle of the anterior end was only slightly annulated. In them the position of the cervical papillae in relation to the cordon length is quite different, the cordons reaching to ·21 mm. from the head, the cervical papillae being ·5 mm. from the head. It would appear that in these forms, for some reason, possibly age or physiological differences in reaction to fixation, the cuticle and the external cuticular structures with it have not been longitudinally contracted.

Vulva in the third quarter of the body length. Eggs 40μ by 29μ. Posterior end of the male coiled into a spiral; four pairs of preanal and five pairs of postanal papillae; spicules ·57 and ·11 mm. long, the shorter being broad with a blunt tip at right angle to shaft, longer acicular with a flap-like termination which may be in line with the shaft or may be bent backwardly from it (fig. 9 a).

With the adult worms are several, presumably of the same species, in various stages of development. Since none of these has a spinous tail typical of Acuariid larvae, these worms are presumably young adults. They show the growth of the cuticular appendages characteristic of the genus. The smallest is 2·5 mm. long and has a vestibule 70μ in length, *i.e.*, nearly that of the adult, while the cordons extend for only 30μ from the head end (fig. 10). In other specimens the cordons are longer; in a worm 6·3 mm. in length, the vestible is 90μ long, and the cordons extend to 90μ from the head. In the specimens with very short cordons, each cervical papilla appears as a single projection, not highly chitinized; in those with "half grown" cordons (90μ long), the cervical papillae are bifid. The shortest worm in which the papillae were trifid was a male, 7·1 mm.

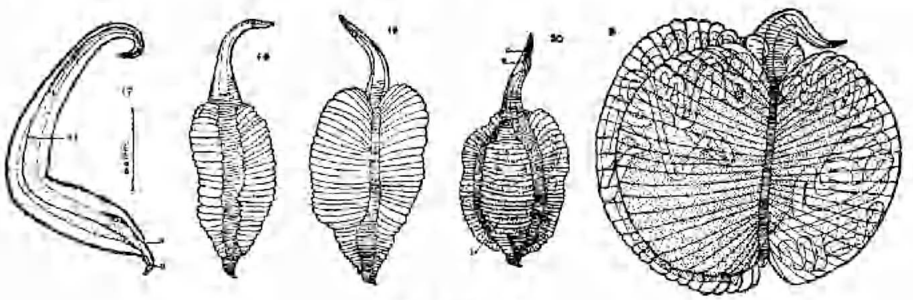

Fig. 17-21
Successive stages in growth of adult female of *Tetrameres australis*. All to same scale.
a, anus; al, ala; c, cervical papilla; e, excretory pore; i, intestine; v, vulva.

in length. The shortest specimens whose sex was determinable were females. In a worm 3·8 mm. in length, the ovaries, vagina and vulva were recognisable, the vulva being situated 2·2 mm. from the head. The smallest specimen in which caudal papillae were distinguishable was 4·4 mm. long, and there were indications of incipient spicules. In all the sexually differentiated young worms the cordons were as long as, or longer than, the vestibule, and the cervical papillae were bifid, not simple. In connection with the growth of cordons and cervical papillae, one may mention the work of Chabaud (1950) on the life history of *Synhimantus spinulatus*.

We have not found any record of the occurrence of adult *Cosmocephalus* in a mammalian host, although Chandler (1942) reported *Synhimantus longigulturatus* from *Procyon lotor*, but inferred that it was an accidental infection. The food of the Australian water rat includes the yabbie (*Cherax destructor*), and various fish, either of which might harbour the larval stage of a bird parasite. We have dissected ten water rats from the Torrens and Lower Murray, and on no occasion were bird remains found in the digestive tract. This fact and the occurrence of *C. australiensis* in a flourishing condition in several water rats from different localities and at various times between 1938 and 1951 make the suggestion of an accidental infection unlikely. The only known species of the genus from Australian birds is *C. jaenschi* J. and M., from the same locality as the present specimens, but the species differ in the proportions of the lengths of the cordons and of the vestibule to each other.

Spirura (s.l.) sp.
(Fig. 22)

In several collections made from *Hydromys chrysogaster* from the lower Murray River, there occurred the posterior ends of a large species of a nematode, apparently a Spirurid. Males and females were found. In no case was an anterior end present, digestion having apparently proceeded from the head backwards in all cases. This deficiency obviated identification of the species. Measurements and a figure of the male tail are given, so that it may be possible to recognise the worm in the future.

Longest part of a female present, 23·5 mm.; of a male 7 mm., and in these an oesophagus was not present. Two ovaries and uteri are opposed; uteri unite, leading to a short vagina and vulva, the latter 6·2 mm. from the posterior end; eggs in vagina measure 40 by 28μ.

In the male are four pairs of preanal papillae and five pairs of postanal, the preanal pair nearest the anus is double-headed. Caudal alae are absent. Sicules are unequal, ·9μ and ·18 mm. respectively.

The size of the eggs and the relative lengths of the spicules in these worms and in the specimens of *Cosmocephalus australiensis* found with them, are similar; but the latter are distinctly smaller and the male tail is coiled in several spirals.

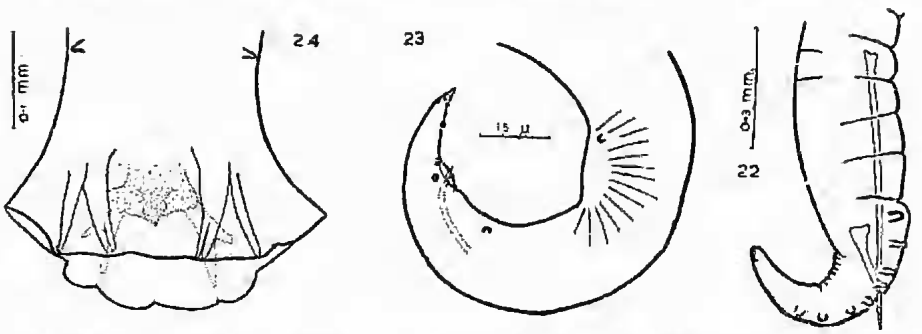

Fig. 22—*Spirura* (s.l.) sp. from *Hydromys*, male tail. Fig. 23—*Subulura peramelis*, male tail. Fig. 24—*Hypodontus macropodis*, bursa.

Contracaecum osculatum (Rud.)

This species is now recorded from the seal, *Gypsophoca tasmaniensis*. The collection included adult as well as the "phocascarid type" of immature worms described elsewhere by us (1945), and was obtained by Mr. J. McNally, from Lady Julia Percy Island, Victoria.

Stomachus sp. immature

Young forms were collected by Mr. McNally from *Gypsophoca tasmaniensis*, Lady Julia Percy Island, Victoria. In two specimens the lips had attained the adult form and the ventriculus was slightly sigmoid. The material suggests *S. similis* which occurs in elephant seals. The latter no longer occur in Australian waters, having been exterminated from Bass Strait by the early sealers.

Subulura peramelis Baylis

From bandicoots, *Isoodon torosus*, collected by Dr. H. Derrick from south-eastern Queensland. Males up to 12 mm. long; females to 17 mm. As in other collections of this species studied by us, the worms are longer than those described by Baylis, and have only three teeth in the buccal capsule.

Pharyngostrongylus alpha J. and M.

From a "white kangaroo" (*Macropus rufus,* albino), from the Koala Park, Adelaide, but previously from Mount Pleasant, South Australia; and from *Macropus major* from Narandera, New South Wales. In our original account we mentioned "six rounded inner lips," but since in specimens from *Macropus major* and in the present material, these are not obvious, it is suggested that the lip-like appearance was due to contraction of muscles surrounding the mouth.

Hypodontus macropodis Mönnig

From a kangaroo, presumably *Macropus major,* the worms having been forwarded from the McMaster Laboratory, C.S.I.R.O., Sydney. The differences between *H. macropodis* and our *H. thetidis* depend on body length, the branching of the dorsal ray of the bursa, and the length of the gubernaculum. In the present material, the dorsal ray resembles that of *M. thetidis;* but the lengths of the worm and the gubernaculum agree with *H. macropodis.* Prebursal papillae are present, as in the latter species; the position of the excretory pore is similar; and there is a backwardly-directed prolongation of the stem of the lateral ray, as noted by Mönnig (1929).

Uncinaria stenocephala Railliet

This hookworm has been identified from a fox, *Vulpes vulpes,* shot in the Adelaide Botanic Gardens.

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